THE EFFECT OF COFFEE CONSUMPTION ON SERUM CHOLESTEROL LEVELS OF SELECTED WORKING MEN AND WOMEN IN COIMBATORE CITY

By

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INTRODUCTION

I INTRODUCTION

With technological and scientific advancement in medical and allied services, efforts are directed to control diseases which afflicit mankind. Coronary Heart Disease is number one man killer today which kills mankind in their prime of life both in developing and developed countries. It represents an enormous medical, social and economic burden to the public.

It has emerged as a major prominent health problem. Today it is the most important cause of premature disability and death in many industrialised countries.

As Ozorio (1988) points out developing countries are developing Coronary Heart Disease, the ills commonly attributed to the industrialised world at such a pace that by the year 2000, the disease will be actively emerging or established in virtually every nation of the third world accounting for between 15-25% of all deaths.

Throughout this century, scientists have been searching for greater knowledge about cardiovascular disease. The relationship of cholesterol to heart disease has been particularly studied. Diet has been one common factor identified as being related.

During the past twenty-five years, countless studies have been conducted in an effort to identify differences between 'normal' and 'coronary-prone' individuals. A number of risk factors other than diet have been studied.

The possible risk factors of Coronary Heart Diseases are heredity, obesity, alcohol, diet, smoking, hypertension, diabetes, elevated cholesterol levels, pills, aging, menopause and coffee intake. Coffee along with other risk factors is also believed to have a role in cardiovascular diseases (Edwardchung,1989)

Several cross-sectional and longitudinal studies have reported that coffee drinking is associated with increased Coronary Heart incidence, mortality and increased levels of serum cholesterol (Rosmarin et al, 1990).

Coffee is extensively consumed in Europe, America and South India. It contains caffeine, tanin and an essential oil which gives it a characteristic aroma (Antia,1989).

Of the major foods on the international market, coffee is among the few to have no nutritional value. It is, therefore, in a particularly vulnerable position and any substantial evidence for a serious health hazard associated with its consumption is of economic as well as medical interest. Interest in terms of a possible cholesterol raising effect.

The cholesterol in elevated levels is the single most important factor, in determining one's risk of developing cardio vascular disease. Heavy coffee drinkers were almost three times more likely to have Coronary Heart Disease than non-drinkers (Lacroix et al,1986).

The studies of coffee in the recent years have focussed on three major Coronary Heart Disease risk-Cholesterol and lipids, Hypertension and Arrhythmogenicity.

Coffee, however, may have specific injurious effects. Repeated findings and research shows of a positive relationship between coffee consumption and serum cholesterol.

The increase in cholesterol levels mainly depends on the method of brewing, boiling or filtering.

People at risk for any kind of heart condition should know that there exists a positive relation between coffee drinking and serum cholesterol levels.

Thus, although some societies enjoy coffee as an infusion and others enjoy it as a decoction, those concerned with it implications for health will have to learn to reduce their exposure to coffee drinking.

In order to re-establish the already proven fact that coffee consumption elevates serum cholesterol levels, the present study was undertaken with the following objectives.

1. Survey the socio-economic background and coffee drinking pattern of selected 300 samples of working men and women in Coimbatore city.

2. Estimate serum cholesterol levels in sub-samples of 30.

3. Find out the effect of coffee consumption on serum cholesterol levels.

REVIEW OF LITERATURE

II REVIEW OF LITERATURE

The related literature of 'the effect of coffee consumption on serum cholesterol of selected working men and women in Coimbatore city' has been reviewed under the following headings:

1. Coffee production and consumption as a beverage in India.
2. Caffeine an important constituent of coffee and its effects on various body systems.
3. Cholesterol: The Big One.
4. Efforts taken so far to establish the relationship between coffee consumption and serum cholesterol.

1. Coffee production and consumption as a beverage in India:

Coffee probably originated in Ethiopia. Around 15th century A.D. the muslims adopted coffee as an alternative to alcoholic beverages which are forbidden to them. By the 17th century coffee had reached Britain and the first coffee house opened in Oxford about 1650 (Dews,1984).

Domestic consumption of coffee has been growing at an annual rate of less than 4% in the 1980's. The per capita consumption of coffee was 80g in 1960-61, 64g in 1970-71 and 75g in 1984-85 (Sathya Sundaram,1990).

Domestic coffee consumption during the 1990 will be around 65,000 tons which is 2.6 percent more than the previous years figures of 63,328 tons (Indian coffee house,1990).

In the 1980's coffee emerged as the second largest traded commodity in the world after oil. India accounts for 2 percent of the total world coffee production. During the period 1980-85, the average annual world coffee production was over 5,460 million kilograms. The U.S.Department of Agriculture has estimated world production for 1989-90 at over 95 millionbags. (Sathya Sundaram,1990).

In 1988-89 coffee production in India was 2.17 lakhs tons. Productivity of the crop showed on encouraging trend touching 930 kg/hectare in 1984-86 compared to 235 kilograms in 1944-45.

TABLE I

COFFEE PRODUCTIVITY IN INDIA

Year	Total (lakh tons)
1980 - 81	118
1981 - 82	150
1982 - 83	120
1983 - 84	105
1984 - 85	196
1985 - 86	122
1986 - 87	192
1987 - 88	120

(Source: Sathya Sundaram,1990)

2. Caffeine - an important constituent of coffee and its effect on various body systems.

Caffeine is probably the most widely consumed drug. The fact is that caffeine is listed as an ingredient in an array of food and drugs: Soft drinks, Choclates, Soft candies, Baked goods, Gelatin, Puddings, Frozen dairy products, Headache remedies, Pain killers, Tea and Coffee and more than 1000 over the counter and prescription drugs (Casey, 1991).

Caffeine is a ubiquitous chemical in our environment and is frequently ingested in food, beverages or proprietory medications (Smith et al, 1982).

The intake of caffeine containing beverages in many adults and children often reaches levels that can induce pharmacological effects (Jacobsen and Thelle, 1987). Coffee and tea are the greatest contributors to daily intake of caffeine (Motulsky, 1989).

What should patients be told about caffeine consumption? It is difficult to determine what constitute an excessive intake of caffeine; 500-600 milligrams daily has been associated with a tolerance that results in withdrawal symptoms. (Hallal, 1986).

Coffee, one of the main sources of caffeine has been found to contain hundreds of chemicals some of which may cause or potentiate the effects that have been linked to caffeine (Hallal, 1986)

Caffeine is like a man who keeps getting arrested for a variety of crimes and misdeameanors but always gets off for lack of evidence. For example, the amount of caffeine in a cup of coffee depends on the size of the cup, the kind of coffee and the way it is made. Generally drip coffee has more caffeine than percolated which has more than instant, which has more than decaffeinated. :(Casey, 1991).

Caffeine has been associated with coronary artery disease, stomach ulcers, cancer of the urinarytract, anxiety, premature birth, stress, chronic sleep disturbances. Relatively small daily amount of caffeine as in 3-5 cups of caffeine can cause dependence and addiction (Aileen Ludington, 1991).

Caffeine is a psychoactive drug. It alters moods or changes behaviour within half-an-hour or less after its swallowed. In a number of significant ways caffeine is related to heart problems. People at risk for any kind of heart condition should know that some studies indicate that caffeine may raise serum cholesterol levels (Francis Soper, 1990).

Since caffeine affects the heart muscles it can accentuate heart rhythm problems (Dobmeyer, 1983).

Caffeine has also been said to raise, lower or not affect blood pressure and heart rate(Onrot et al, 1984).

Consuming more than six cups of coffee per day was found to cause a 2½ times increase in the risk of Myocardial Infarction in women (Whit sett, 1986).

Caffeine generally increases Basal Metabolic Rate (Lyn Steward et al, 1988). As a stimulant, caffeine has a direct effect on the brain and Central Nervous System. This immediate result is widely known as the 'lift' that helps million get going in the morning or get started again after a break from work. "Caffeine does not improve memory, comprehension, or the ability to function on a test", says Dr.Patricia Mutch, Professor of Nutrition at Andrews University at Michigan. Caffeine boosts urine output. It actually causes the body to eliminate more liquid than it takes in. This dehydrating quality may wash away important minerals. Caffeine also interferes with sleep. The amount of caffeine found in one cup of coffee causes a four fold increase in wakefulness. Caffeine increase levels of glucose in the body and causes a surge in energy. But this feeling is at the expense of the reserves of nutrients the body normally draws on for activities. Caffeine seems to enhance atheletic endurance and ,

capacity for muscular work. It also makes the stomach secrete more juice than normal (Francis Soper,1990).

Experimental work shows that caffeine, a constituent in coffee does increase the blood free fatty acids (Cocchi et al, 1983).

The use of coffee or other caffeine containing beverages appears to increase the release of fatty acids in the blood. (Helen Guthrie, 1986).

Caffeine interferes with fat metabolism in the body. It also has shown to reduce Iron and calcium absorption. It is so irritating to the stomach that high doses will induce vomitting (Aileen Ludington,1991).

The evidence that coffee may contain animal carcinogens prompts further enquiry into a possible link between coffee consumption and cancer in human beings (Mac Mohan et al,1980).

In a cohort study of nearly 24,000 Seventh Day Adventists, (Snowdon and Philips,1984) found a positive association between deaths from bladder cancer and coffee consumption by people who never smoked.

In three case controlled studies, association were found between coffee consumption and risk of bladder cancer: in Greece (Rebelakos et al, 1985),in Connecticut (Marrett et al,

1983), and in United States (Hartage et al, 1983).

A corelation between coffee drinking and rates of death from pancreatic cancer has also been found (Binstock et al, 1983).

In three case controlled studies - in Israel (Lubin et al, 1985), The United States (Rosenberg et al, 1985), and France (Le, 1985) - investigators examined evidence for a possible relationship between coffee drinking and risk of breast cancer.

In two case-control studies - one in Italy (La Vecchia et al, 1984) and in Greece (Trichopoulos et al, 1984) evidence was found for an association between coffee drinking and increased risk of ovarian cancer.

Martin and Bracken (1987) reported that the consumption of coffee appears to cause growth retardation in full term newborns.

Sure, the caffeine might pick you for a while, but in the end it will always let you down (Francis Soper, 1990).

3. Cholesterol: The Big One.

Consumers are becoming increasingly aware of the nutritional value of food. Particularly in relation to the fatty acid composition and cholesterol content. Most in the community understand the increased levels of cholesterol in the blood increase the risk of developing heart and arterial diseases (Hood, 1987).

In a major study, Ancel Keys, PhD and his team observed more than 12,000 men in seven different countries over a period of twelve years. This study found clear connection between heart disease and blood cholesterol (Hans Dichl, 1989).

High serum cholesterol and high serum triglycerides concentration together are positively co-related with Myocardial Infarction (Hamid and Gupta, 1983).

Ethnic groups (relative risk 3:1) and Indians had significantly higher LDL Cholesterol concentration than other groups (Miller et al, 1982).

The risk factors associated with blood cholesterol levels are weight, alcohol, coffee intake, exercise, diet, vitamins, smoking and carbohydrate, pill, aging, menopause and illness. Blood cholesterol levels can be measured considering one's age, height, weight, family history and life style (Craig, 1988).

Defects in regulation of any aspect of cholesterol metabolism leads to pathological conditions. A fundamental need in nutrition science is to identify the genetic aspects of the regulation of cholesterol metabolism that are amenable to dietary intervention. Many aspects of diet affects cholesterol metabolism; amount of composition of protein,

carbohydrate, fat, total food consumption and meal patterns. Indirectly, dietary factors that impinge on other risk factors for hypercholesterolemia; diabetes, hypertension, obesity must be considered. (Jacqueline Dupont, 1990).

4. Efforts taken so far to study the relationship between Coffee consumption and serum cholesterol:

Is there life before coffee? People who need a cup to wake up in the morning may well ask if there is life after coffee, too because their favourite beverage has been added to the list of items that are believed to increase serum cholesterol levels (Williams, 1985).

A Survey report on coffee consumption in four cities (Madras, Mangalore, Belgaum and Madurai) of South India shows that 86% in Madras, 84% in Madurai, 70% in Mangalore and 20% in Belgaum consume coffee daily. Coffee drinking is high in 21-30 years of age. Coffee is viewed as a costly drink than tea by the lower income group (Babu Prasad, 1989).

In a study to establish a relationship between coffee and serum cholesterol a strong consistent association between the total cholesterol concentration was observed. The study showed that intake of 6 or more cups of boiled coffee increased the serum cholesterol concentration in healthy subjects.(Arnesen et al, 1984).

In (1983) Thelle et al reported positive co-relation between plasma cholesterol and coffee intake. Statistically the association seemed highly significant. The effect appeared to be substantial for men who drank 9 or more cups per day.

In a cross-sectional study of nearly 5,000 Australians it was found that total caffeine consumption was positively co-related with the serum cholesterol levels in women, while the use of caffeinated coffee but not total caffeine intake, was positively corelated with serum cholesterol levels in men. (Shirlow and Mathers,1984).

In number of other cross sectional studies positive co-relationship was established between coffee intake, and serum cholesterol (Klatsky et al, 1985) (Green and Tucha, 1986).

Many other studies have given positive results on a cholesterol raising effect of coffee (Mathias et al,1985, Curb et al, 1986).

Another possible contributor to discrepancies between population is the brewing method. Caffeine levels in coffee also depend on the product form,example ground, roasted vs instant, the methods of brewing,example percolated vs drip, the amount of coffee used and the brewing time (Dews, 1984).

Drinking filtered coffee does not affect serum lipid levels (Annette Bak et al,1989).

Researchers at the Erasmers University Medical School found that boiled coffee in which ground coffee is boiled directly in water significantly increases cholesterol levels. (The Hindu, 1990).

The further observation of the Tromso Heart study that subjects who drank filtered coffee showed no significant rise in serum cholesterol values (Martin and Woo,1985).

The higher cholesterol levels due to heavy coffee drinking suggest that heavy coffee drinkers are twice as likely as non-coffee drinkers to develop Coronary Heart Diseases. However, representative of the National Coffee Association and the National Heart, Lung and Blood Institute both believe that elevated cholesterol levels alone cannot be used to indicate chances of developing disease (Williams,1985).

Until the relationship between coffee and serum cholesterol is more clearly defined, it cannot be uniformly recommended that coffee intake be curtailed, although it may be reasonable for those with hypercholesterolemia to undergo a trial of abstention at best, or at a minimum change to drinking filter-brewed coffee in low to moderate amounts (Davis et al,1988).

METHODOLOGY

III METHODOLOGY

The study on 'the effect of coffee consumption on serum cholesterol levels of selected working men and women in Coimbatore city', was designed and carried out in the following steps.

A. Selection of the Area.
B. Selection of the Sample.
C. Selection of the Tool.
D. Conduct of the Study.
   1. Selection of sub samples.
   2. Biochemical estimation.
E. Analysis of the data.

Selection of the Area:

The study was conducted in the city of Coimbatore. It was chosen as it was a big city with a large population and also for the sake of convenience. The places chosen for the study were banks, offices, hotels, schools where large number of people can be found.

Selection of the Sample:

The samples chosen for the study comprised of 150 working men and 150 working women. They were both single and married belonging to lower, middle and higher income groups. The sample were between the age group 25 to 45 years.

This age group was chosen because they comprised of adults. They were self sufficient and had their own established food habits.

Stratified Random Sampling was employed to select samples. Stratified Random sample is one in which random selection is done not from the universe as a whole but from different parts or strata of a universe. In this method care has to be taken to see that each stratum are as homogenous as possible (Elhance, 1984).

Samples were chosen from various income levels. The low income group consisted of labourers, mill workers etc. Middle income consisted of office assistants, managers and high income earners were mostly business people, executives, bank managers etc.

The income groups (Hindu,1990) has categorised the income strata as follows:

1)	0 - 2000	-	Low income
2)	2000 - 10000	-	Middle income
	2000 - 3000	-	Lower middle income
	3000 - 5000	-	Middle middle income
	5000 - 10000	-	Upper middle incoem
3)	10000 and above	-	High income

Working men and women were selected because they are more liable to drink many cups of coffee. The reason for this is primarily, it is supplied free of cost in many organisations and secondarily due to the mounting work load they are liable to drink more cups.

Selection of the Tool :

A preliminary questionaire was formulated by the investigator in order to collect information about the family background, socio-economic status, the expenditure pattern on food with a special reference to coffee, the number and the amount of coffee consumed, family history and personal history of diseases which is given in Appendix I.

A questionaire is one of the most popular methods used to collect primary data these days. A questionaire may be defined as an instrument for collecting information from a number of persons; supposed to possess it by making them record their replies to a number of questions (Shukla and Gulshan, 1981).

Conduct of the Study:

The study was carried out in various banks, hotels, schools offices and factories. These areas were selected because all classes of people can be found in large groups.

Rapport was established with the members to whom the questionaires were given and information was collected on various aspects of the questionaire.

Selection of Sub-samples:

The sub-samples were selected after a preliminary survey on 300 working men and women. The sub-samples selected comprised of 10 percent of the total samples. The sub-samples amounted to 30 in number; 15 men and 15 women.

They were selected on the number of coffee cups they consumed and a clean bill of health with no known disease condition and also on the basis of convenience and their co-operation to estimate the serum cholesterol levels.

A three day recall method was conducted to know the food consumption pattern of these sub samples.

Bio-chemical Estimation:

The estimation of serum cholesterol was conducted on 15 working men and 15 working women respectively.

The serum cholesterol was estimated using Zak's method. (Appendix II) (Vareley, 1980).

Blood was drawn for estimating serum cholesterol by the investigator with full approval and co-operation of the members. The serum cholesterol was estimated quantitatively for the 30 sub-samples.

Analysis of the Data:

Data thus collected was consolidated, analyzed and interpreted.

Chi square test was applied to find the effect of coffee drinking on income levels of the samples.

Co-relation coefficient was used to find out the effect of coffee drinking on serum cholesterol levels of the subsamples.

RESULTS AND DISCUSSION

IV RESULTS AND DISCUSSION

The results of the study on 'the effect of coffee consumption on serum cholesterol levels of selected working men and women in Coimbatore city' are discussed under the following headings.

A. Background information, Socio economic status and Coffee drinking pattern of the total samples.

B. Dietary Picture of the sub samples.

1. Daily meal pattern
2. Food intake
3. Nutrient intake

C. Cholesterol levels of the Sub sample.

D. Effect of coffee drinking on serum cholesterol.

A. Background information, socio economic status and pattern of coffee drinking in terms of:

Age: The samples chosen for the study were 300 in number on a total and belonged to the age-group between 25-45.

The following data illustrates the percentage of men and women in the selected age group.

Out of the total samples of men the percentage belonging to 25-35 years and 35-45 years were 47.3 percent and 52.7 percent respectively.

In women the percentage in the age-group 25-35 years were 61.3 percent and 35-45 years were 38.7 percent.

Weight:

Weight ranged from 35 Kg. to 75 Kg in women and from 45-75 Kg in men. The Table II below illustrates the percentage of sample in various ranges of weight both in men and women.

TABLE-II

MEAN WEIGHT OF THE SELECTED SAMPLE

Weight in Kg.	Percentage distribution	
	Men N-150	Women N-150
35-45	-	6
45-55	16	42.7
55-65	44.7	42
65-75	30.7	8.6
75 & above	8.6	0.7

The maximum number of samples are in the weight range 55-65 Kg. constituting 44.7 percent and 42 percent in both the sexes.

Height:

Table III shows the heights of the samples.

TABLE-III

MEAN HEIGHT OF THE SELECTED SAMPLE

Height in cm.	Percentage distribution	
	Men N-150	Women N-150
150-165	46	90
165-180	54	10

Coffee and non-coffee drinkers in various income levels:

TABLE-IV

PERCENTAGE OF COFFEE AND NON-COFFEE DRINKERS IN VARIOUS INCOME LEVELS

Income Level in Rs.	Percentage distribution N - 300	
	Coffee drinkers	Non Coffee drinkers
0 - 2000	58	0.7
2000 - 10,000	38.3	2
10,000 and above	1	-

The various strata of income is classified as follows:

0	-	2000	=	Low Income
2000	-	10000	=	Middle Income
2000	-	3000	=	Lower middle Income
3000	-	5000	=	Middle middle income
5000	-	10000	=	Higher middle income
10000 and above			=	High income (Hindu 1990)

The above Table IV shows the percentage of coffee and non coffee drinkers in various income levels. This table indicates decrease in coffee drinking as the income level increases.

In the lower income group ie., from 0-2000 , 58 percent of the total sample of 300 men and women drink coffee. In the middle income group 38.3 percent and in high income group 1 percent drink coffee.

The income level and its relation to coffee drinking was estimated and tested by using the chi-square test. It was found that the relation was positively significant at 0.05 percent level.

Type of Family:

Samples belonged to both Nuclear and joint family systems. Fifty seven percent of men and 72.7 percent of women belonged to Nuclear family and 46 percent of men and 27.3 percent of women belonged to Joint families.

Expenditure on food:

TABLE-V

MEAN MONTHLY INDIVIDUAL FOOD EXPENDITURE OF THE SELECTED SAMPLES

Food Expenditure in Rs.	Percentage distribution	
	Men N=150	Women N=150
0 - 200	32	72
200 - 400	64.8	22.6
400 and above	3.2	5.4

Thirty two percent of men and 72 percent of women spend in the range of 0-200 rupees for food monthly. In the range of 200-400 64.8 percent of men and 22.6 percent spend their money on food and in the range above 400 only 3.2 percent of men and 5.4 percent of women spend on food.

Expenditure on coffee:

Coffee has become a very popular beverage among the population. People wake up with a cup of coffee in the morning and many more drink it throughout the day (Casey,1991).

The Table-VI illustrates the expenditure spent on coffee by samples.

TABLE-VI

MEAN MONTHLY INDIVIDUAL EXPENDITURE SPENT ON COFFEE BY THE SAMPLES

Expenditure on Coffee in rupees per month	Percentage distribution	
	Men N=150	Women N=150
0 - 50	66	67.3
50 - 100	30	30
100 and above	1.3	-
None	2.7	2.7

Sixty six percent of men and 67.3 percent of women spent about 0-50 Rupees on coffee. 30 percent of men and 30 percent of women spent from 50-100 Rupees per month on coffee. In the range of 100 and above 1.3 percent of men spent for coffe alone.

Coffee drinking pattern:

TABLE-VII

COFFEE DRINKING PATTERN OF SAMPLES SURVEYED

Amount in ml/Day	Percentage distribution	
	Men N=150	Women N=150
0 - 200	34.6	32
200 - 400	33.3	48.6
400 - 600	22	14
600 - 800	5.3	2.6
800 - 1000	2.6	-
None	2.6	2.6

From the Table VII it is evident that the highest percentage of coffee consumed is in 0-200 ml range in men amounting to 34.6 percent and 200-400 ml range in women amounting to 48.6 percent.

The above table clearly indicates that men drink more coffee than women. The coffee drinking pattern in the 400-600 ml range men amount to 22 percent by contrast to 14 percent in women.

People who don't drink coffee are 2.6 percent in men and 2.6 percent in women.

Reasons for coffee drinking:

Many people drink coffee because of habit and some others drink as find it stress relieving, stimulating or good in taste.

The fact that coffee is stimulating is because of it's caffeine content (Casey,1991).

TABLE-VIII

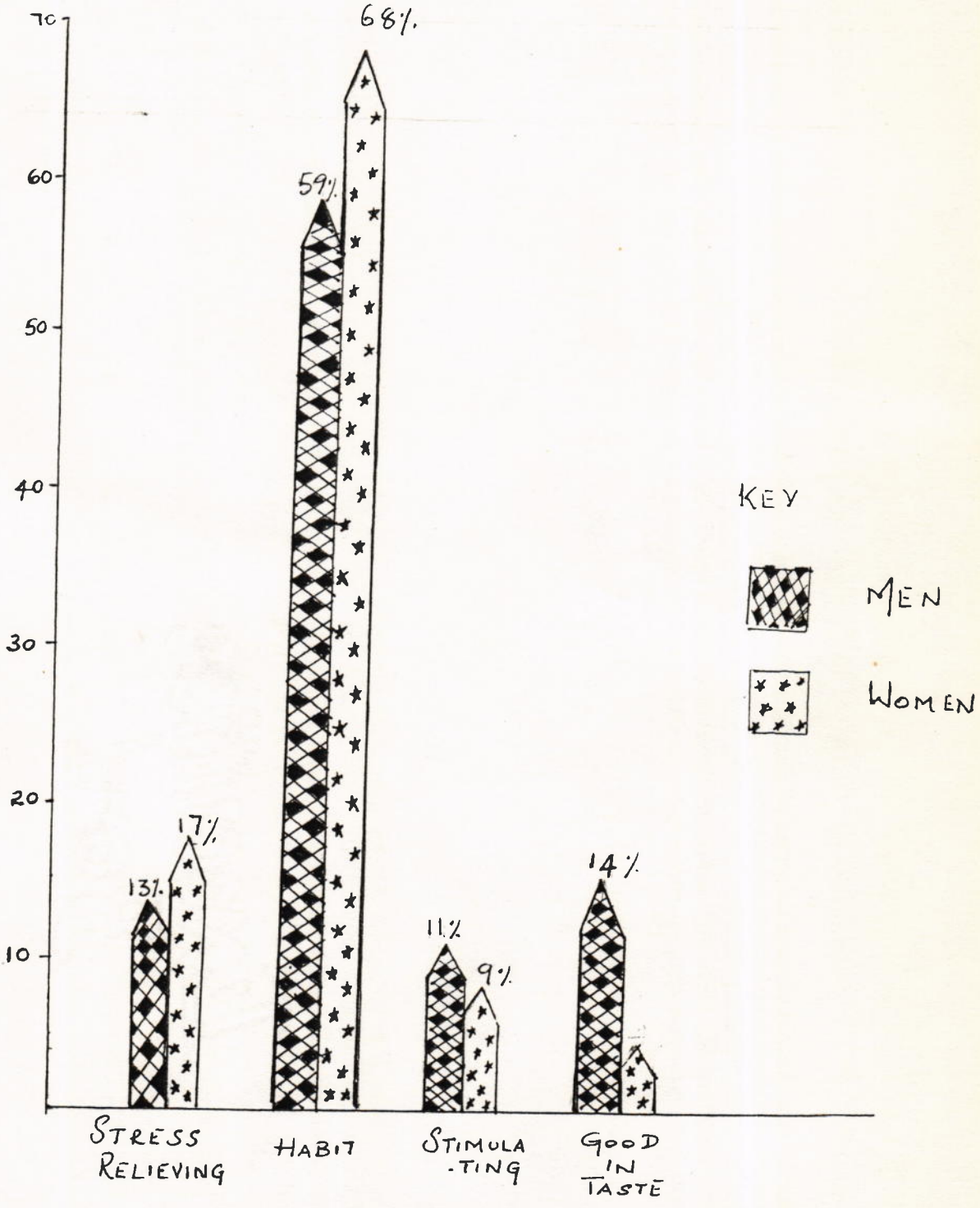
REASONS GIVEN BY THE SAMPLES FOR DRINKING COFFEE

Reasons	Percentage distribution	
	Men N=150	Women N=150
Stress Relieving	13.3	16.6
Habit	58.7	68
Stimulating	10.7	8.6
Good in Taste	14.7	4

In men and women coffee is consumed mainly because of habit amounting to 58.7 percent and 68 percent respectively. In men 13.3 percent and 16.6 percent in women find it stress releiving; 10.7 percent of men and 8.6 of women find it stimulating; 14.7 percent and 4 percent drink it as they find it good in taste (Figure I).

FIGURE I

PERCENTAGE SHOWING REASONS FOR COFFEE DRINKING OF THE SAMPLES SURVEYED.



Habit of coffee drinking:

Coffee is taken either with meals before meals or after meals according to the individual's habit.

Eighty eight of men and 74 percent of women drink coffee with meals. Twelve percent of men and 26 percent of women drink before, after or in between meals.

Method of coffee brewing:

Method of preparation of coffee is varied. It can be brewed in a number of ways like instant coffee, boiled coffee or filtered coffee.

According to Martin and Woo (1985) subjects who drank filtered coffee showed no significant rise in serum cholesterol values.

However, boiled coffee has an effect on serum cholesterol levels amounting to a net increase of 10% of the base-line level (Annette Bak,1989).

Maximum number of samples use filter coffee as the method of brewing. Preparation of boiled coffee is followed only by 2.7 percent of men and 9.3 percent of the total samples. Remaining 28 percent of men and 22 percent of women consume instant coffee. The above is depicted in Figure II.

MEN

WOMEN

PERCENTAGE DISTRIBUTION OF METHOD OF BREWING OF COFFEE BY THE SAMPLES

Figure - II

Type of coffee:

Table IX below shows the percentage distribution of the type of coffee preferred by the samples.

TABLE-IX

TYPE OF COFFEE PREFERRED OR CONSUMED BY THE SAMPLES

Type	Percentage distribution	
	Men N=150	Women N=150
Light	66.6	65.3
Medium	28	22.7
Strong	2.7	9.3

Largest percentage of samples preferred light coffee both in men (66.6 percent) and women (65.3 percent) Twenty eight percent of men samples and 22.7 percent of women samples preferred medium coffee. Only 2.7 percent and 9.3 percent consumed strong coffee in men and women respectively. In light coffee very little amount of coffee decoction or powder and a large amount of milk is added. By contrast, in the preparation of strong coffee little amount of milk and a large amount of coffee docoction is added.

Family history of diseases:

Family History should be throughly scrutinized in order to ascertain the risk factor of a disease in any individual.

Occurence of Coronary Heart Disease in close relatives increases one's chance of developing these diseases (Eleanor and Mary,1984).

TABLE-X

PREVALENCE OF FAMILY HISTORY OF DISEASES

Disease Type	Percentage distribution	
	Men	Women
Cardiovascular	4	-
Diabetes	7.3	4.7
Hypertension	5.3	4

Table X illustrates 4 percent of the samples have a family history of Cardio Vascular Disease in men; 7.3 percent and 4.3 percent of men and women have a family history of Diabetes; and 5.3 percent of men and 4 percent of women had a family history of Hypertension.

Personal history of diseases:

From the surveyed samples 0.65 percent of men and 0.65 percent of women suffered from cardiovascular disease; 3.4 percent of men had a case of diabetes and 0.65 percent of men and 0.65 percent of women had hypertension.

Ninety-five percent of men and 98.7 percent of women had a clean bill of health.

TABLE-XI

PREVALENCE OF DISEASES AMONG SAMPLES

Diseases	Men N=150		Women N=150	
	Yes	No	Yes	No
Cardio vascular diseases	0.65		0.65	
Diabetes	3.4	95.3		98.7
Hypertension	0.65		0.65	

Intake of meals:

Out of the total samples 95.3 percent in men and 92.7 percent in women had their meals regularly.

In men 4.7 percent and in women 7.3 percent had improper eating habits.

Type of oil used in cooking:

Intake of oil also is a factor in ascertaining the risk of Coronary Heart Disease. Therefore the type and amount of oil also has to be studied. There are many types of oils in today's market like groundnut oil, gingelly oil, Sunola, Saffola, Refined oil, Palm oil, Coconut oil etc. The table XII down shows the percentage distribution of oil used by the samples.

TABLE-XII

TYPE OF OIL CONSUMED OR USED BY THE SAMPLES

Type of Oil	Percentage distribution	
	Men N=150	Women N=150
Groundnut Oil	33.3	41.3
Gingelly Oil	36	16
Sunola Oil	5.3	8.7
Refined Oil	11.3	20
Palm Oil	0.7	4.7
Coconut Oil	13.3	9.3

Amount of oil used per day per person:

Amount of oil used per day was divided into two ranges of 0-30 ml and 30-60 ml. Eighty six percent of men and 81.3 percent of women used 30 ml of oil per day. Fourteen percent of men and 18 percent of women used 30-60 ml of oil per day.

Intake of fried items:

Intake of fried items also contributes to the total fat consumption in a day. The following Table XIII shows the frequency of intake of fixed items by the samples.

TABLE-XIII

FREQUENCY OF INTAKE OF FRIED ITEMS BY THE SAMPLES

Frequency of intake	Percentage distribution	
	Men N=150	Women N=150
Daily	11.3	4.7
Often	22	22.7
Occassionally	42	47.3
Rarely	22	25.3
None	2.7	-

Maximum number of samples in men and women consume fried items occasionally, their percentages being 42 and 47.3 in men and women respectively. Only 11.3 percent of men and 4.7 percent of women take fried foods daily; 22 percent of men and 22.7 percent of women take fried foods often and 22 percent of men and 25.3 percent of women eat fried items rarely.

Only 2,7 percent of men do not eat fried foods at all.

B. Dietary Picture of the Sub-Samples:

(1) Daily meal pattern:

A 3-day meal pattern was studied by making use of the Recall method to have an over all idea of the foods consumed on the selected subsamples of 15 men and 15 women.

The following table XIV shows the percentage of the sub samples meal pattern.

TABLE-XIV

MEAL PATTERN OF THE SELECTED SUB SAMPLES

Meal Pattern	Percentage distribution	
	Men N=15	Women N=15
Early Morning Coffee	86.6	100
Breakfast Porridge/Idli/Dosai/Upma	80	73
Coffee	53	6.6
Midmorning Coffee	66.6	33.3
Lunch Rice Rasam/Sambhar/Greens/ Poriyal/Curds	100	100
Coffee	13.3	--
Mid afternoon Coffee	33.3	--
Tea Coffee	100	100
Vada/Bonda/Biscuits	40	46.6
Dinner/ Rice/Chappati/ Idli/Dosai/Upma	100	100
Coffee	13.3	--

From the above table it is clearly shown that out of the subsamples in men 80 percent of them have either Porridge/Idli/Dosai/Upma for their breakfast and the remaining 20 percent skip. In women, 27 percent skip Breakfast. Lunch and Dinner is eaten regularly by the sub samples.

It also illustrates the coffee drinking pattern of the sub samples. Coffee is consumed regularly early in the morning and at tea by both the sexes. At other times drinking coffee is according to the individual's habit. Coffee consumption at lunch and dinner is done only by 13.3 percent of men and in women.

2.a) Income level of subsamples:

In the 30 subsamples selected 7 men and 8 women belonged to the lower income group ie., from 0-2000 Rs/month. Eight men and seven women belonged to the middle income group ranging from 2000-10000 Rs/month. None of the subsamples belonged to the higher income group.

2.b) Food intake:

The food intake calculated through the 3-day recall method is presented in Table-XV. The mean values is compared with the food allowances of Indian Council of Medical Research (1981) for men and women in the following table.

A balanced diet is one which contains different types of foods in such quantities and proportions that the need for calories, minerals, vitamins and other nutrients is adequately met and a small provision is made for extra nutrients to with stand short durations of leanness (Gopalan et al,1987).

TABLE XV

COMPARISON OF DAILY MEAN FOOD INTAKE OF THE SUBSAMPLES WITH RECOMMENDED DIETARY ALLOWANCE(1981)(MEN).

Food Items	RDA (g)	Mean Food intake(g)
Cereals	520	352
Pulses	40	39
Green leafy Vegetables	40	64
Other Vegetables	60	42
Roots and Tubers	50	46
Fruits	30	80
Milk	200	300
Fats and Oils	45	44
Nuts and Oilseeds	50	23
Meat and Fish	30	32
Egg	30	17
Sugar	35	37

Consumption of cereals by the sub samples is much lower than the recommended allowance with a deficit of 1689 m. The consumption of pulses, roots and tubers, meat and fish, sugar is more or less equal to the recommended food allowances.

Fats and oils consumed by sub samples is almost equal to that of recommended allowances.

Fuits, milk are eaten more than the required amount with a surplus of 50 grams and 100 ml respectively.

Egg, nuts and oil seeds and other vegetables consumed by the sub samples is much lower than the recommended amounts.

TABLE-XVI

COMPARISON OF DAILY MEAN FOOD INTAKE OF SUB SAMPLES WITH RECOMMENDED DIETARY ALLOWANCE (1981) (WOMEN).

N = 15

Food items	RDA (g)	Mean food intake(g)
Cereals	450	302
Pulses	45	40
Leafy Vegetables	100	60
Other Vegetables	40	37
Roots and Tubers	50	46
Fruits	30	42
Milk	150	199
Oil and fats	25	34
Nuts and Oil Seeds	40	59
Meat and Fish	30	24
Egg	30	49
Sugar	20	24

From the above table the consumption of various foods by the sub samples is know Cereals, like men is much lower than the recommended allowance with a deficity of 138 g. The food items that are lower than the recommended food allowances are pulses with a deficit of 5 g;, Leafy vegetables with a deficit of 40 g; roots and tubers with a

deficit of 4 g; other vegetables with a deficit of 3 g and meat and fish with a deficit of 6 g are depicted clearly in the Table XVI.

Fats and oils are 9 g higher than the recommended allowance. Other food items which are consumed more than the recommended amounts are sugar, egg, nuts and oil seeds, milk and fruits.

3) Nutrient intake of subsamples:

Human beings require sufficient amounts of proximate principles (carbohydrates, fats and proteins) vitamins and minerals to enable them to live and thrive.

A well balanced diet should contain all these factors in correct proportions and adequate amounts. A diet should be such that so as to supply sufficient quantity to provide the needed energy and also ensure at least a minimum supply of the essential nutrients to maintain life processes in proper working order (Gopalan et al, 1987).

Table XVII presented gives the mean intake of men compared with Recommended Dietary Allowance.

TABLE-XVII

COMPARISON OF DAILY MEAN NUTRIENT INTAKE OF THE SUBSAMPLES WITH RECOMMENDED DIETARY ALLOWANCE (1989) (MEN).

N = 15

Nutrients	RDA	Mean
Proteins (g)	60	61.6
Fats (g)	15	59
Carbohydrates (g)	405	352
Energy (K.cal.)	27.00	2255
Calcium (g)	0.4	0.7
Iron (Mg)	28	28
Thiamine (Mg)	1.4	1.14
Riboflavin (Mg)	1.6	1.3
Niacin (Mg)	18	11.2
Vitamin (Mg)	40	96
Crude Fibre (g)	-	5.2

The table XVII shows the various mean nutrients compared with the Recommended Dietary Allowance (1989).

The consumption of protein is almost equal. The Recommended Dietary Allowance for fat is 15 g as against the mean nutrients value of 59g. As regards to percentage the mean fat intake amounts to 20% of the total calories. Whereas, the Recommended Dietary Allowance recommends only 5% of the total calories.

This high amounts of fat in sub samples shows that intake of fat is high.

The biggest source of fat in our diets is from fats and oils that are added in many of our common foods (Dorothy et al, 1983).

Carbohydrate is less than the allowance recommended with a deficit of 53 g. The mean energy intake is also lower than the Recommended Dietary Allowance with a deficit of 445 kilo calories. Iron allowance is equal to that of the recommended allowance. Levels of thiamine, niacin, riboflavin are lower than the allowances recommended. Vitamin C and calcium values are higher than the Recommended Dietary Allowance with a surplus of 56 mg and 0.3 mg respectively.

TABLE-XVIII

COMPARISON OF DAILY MEAN NUTRIENT INTAKE OF SUB SAMPLES WITH RECOMMENDED DIETARY ALLOWANCE(1989)-(WOMEN)

N = 15

Nutrients	RDA	Mean Nutrient Values
Protein (g)	50	50
Fat (g)	15	49
Carbohydrates (g)	315	284
Energy (Koal)	2100	1858
Calcium (g)	0.4	0.5
Iron (mg)	30	36.4
Thiamine (mg)	1.1	0.9
Riboflavin (mg)	1.3	1.0
Niacin (mg)	14	9.4
Vitamin C (mg)	40	59
Crude Fibre (g)	-	4.0

Protein allowances of the sub samples are the same as the Recommended Dietary Allowances for women.

Fat values are higher in the mean intake of sub samples in women when compared to the recommended allowances. The Recommended Dietary Allowance for fat is 15 g as against the mean nutrient intake of 49 g. There is a surplus of 33 g in the diet of women sub samples. The fat consumption is seen to be high.

Carbohydrate and energy values in the mean nutrient intake are lower showing a deficit of 31 g and 242 kilo calories respectively; the Recommended Dietary Allowance values being 315 g for carbohydrates and 2100 for energy in women and moderate activity.

Calcium, iron, vitamin C values are high when compared to the dietary allowances recommended. Niacin, riboflavin and thiamine are lower than the allowances recommended.

C) Cholesterol levels of subjects:

Serum cholesterol levels of sub samples were estimated using the Zak's method which is given in (Appendix II). Table XIX shows the range of cholesterol and percentage of subjects.

TABLE-XIX

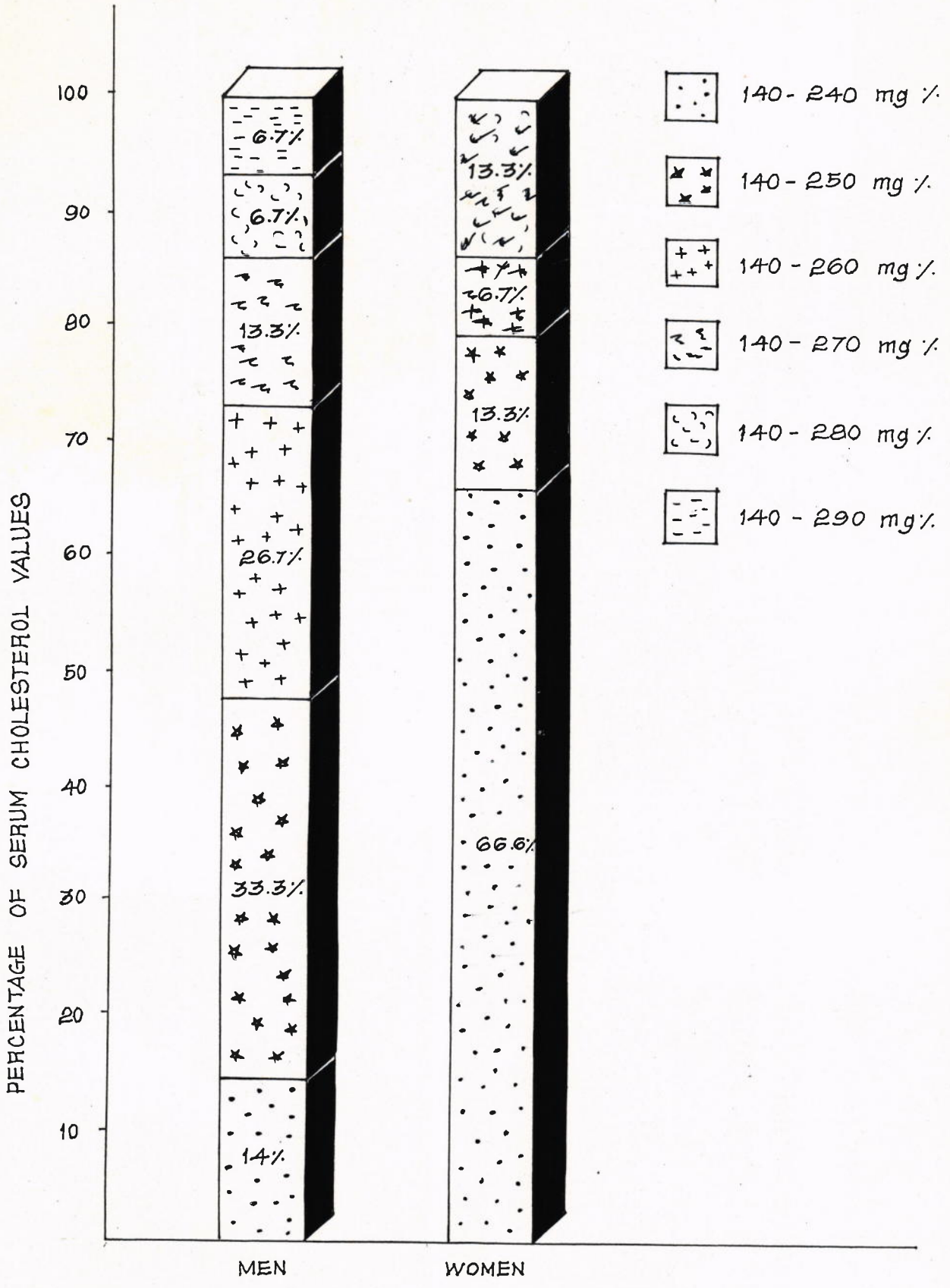
SERUM CHOLESTEROL LEVELS IN SUB SAMPLE

Serum Cholesterol mg %	Percentage distribution	
	Men N=15	Women N=15
140 - 240	13.3	66.7
140 - 250	33.3	13.3
140 - 260	26.7	6.7
140 - 270	13.3	13.3
140 - 280	6.7	--
140 - 290	6.7	--

The above Table XIX clearly indicates that 13.3 percent of men and 66.7 percent of women have normal cholesterol values, the normal cholesterol range being 140-240 mg. percent.

Serum cholesterol ranges between 140-250 mg percent constitute 33.3 percent of men and 13.3 percent of women sub samples.

Six percent of women and 26.7 percent of men have cholesterol values ranging from 140-260 mg percent. Between ranges of 140-270 mg percent the percentage in men is 13.3 mg percent and 13.3 percent in women. Only 13.4 percent of sub samples in men have serum cholesterol values above 270 mg percent (Figure III).



PERCENTAGE OF SERUM CHOLESTEROL VALUES OF SUBSAMPLES

Figure - III

The USA National Cholesterol Education Programme proposed the following guidelines for serum cholesterol.

200 mg/dl is designated as desirable 200-239 mg/dl is designated as border line high and 240 mg/dl is designated as high (Mccray et al,1990).

The increase in blood cholesterol values can be due to dietary factors like intake of excessive fats, oils, cholesterol raising food stuffs, excessive coffee consumption etc.

Apart from the dietary factors the risk factors associated with increase serum cholesterol levels are Weight, Alcohol, Coffee intake, Smoking, Carbohydrates, Medical Illness and Aging (Craig,1988).

Limitation of dietary cholesterol is a very important aspect to reduce serum cholesterol (Michael et al,1986).

Silas and Dodu (1984) have reported that Nutritional habits favouring increase serum cholesterol levels are acquired early in life.

Results of many metabolic studies also indicate that dietary cholesterol increase serum cholesterol in a step-wise fashion as the cholesterol intake is increased from less than 200 mg to 1000 mg or over (Kolato,1982).

D) Effect of coffee consumption on serum cholesterol levels of sub samples:

The effect of coffee consumption on serum cholesterol was estimated statistically in the sub samples. A co-relation was computed statistically to know if coffee consumption had a definite effect on serum cholesterol or not.

The co-relation co-efficient for men was found to be 0.09 for men and 0.34 for women. The Corelation coefficient computation is given in Appendix V.

The results showed that the effect of coffee consumption on serum cholesterol was positive.

Many studies have reported a positive effect of coffee and serum cholesterol. Data obtained from a study in Jerusalem between coffee and plasma cholesterol gave positive results.(Kark et al,1985).

SUMMARY AND CONCLUSION

V. SUMMARY AND CONCLUSION

The study was undertaken to find the effect of coffee consumption on serum cholesterol levels. The dietary factors which may affect serum cholesterol levels were also studied on adult working men and women in Coimbatore city. Three hundred samples were chosen in the age group 25-45 out of which 150 samples were men and 150 samples were women.

Out of these samples, 10 percent was chosen to make a detailed study of their dietary intake employing a 3 day recall method, their coffee consumption pattern, amount of coffee drinking and estimation of serum cholesterol levels using Zak's method. Only healthy subjects were chosen and persons with known family history and personal history of diseases were discarded.

The summary of the findings of the study is discussed as follows:

In the age group 25-45 years which was divided further into 25-35 years and 35-45 years the percentage of men in the latter age group(52.7 percent)and percentage of women (61.3 percent) in the former age group were the largest.

Height of both men and women varied from 35 kg to 75 kg and height varied from 150 cm to 180 cm.

Coffee drinkers constituted 97.3 percent of the total samples surveyed and non-coffee drinkers 2.7. percent..

Samples belonged to both Joint and Nuclear family systems with a higher percentage of men & women in Nuclear family system.

Monthly expenditure spent for food was also recorded with a special reference to expenditure on coffee. Highest percentage in coffee spending were in the range of 0-50 Rupees per month in both men and women.

In the coffee drinking pattern, some men consumed upto 1000 ml of coffee per day. Whereas in women only 26 percent consumed from 600-8000 ml range and none above that.

This shows that men are more addicted to coffee than women.

Habit was the reason for coffee drinking in the samples.

Eighty eight percent of men and seventy four percent of women drank coffee with meals. The rest 12 percent men and 26 percent women had it before or after meals.

Among the surveyed samples Filter Coffee was the method of brewing by many. Least percentage was for Boiled method of preparing coffee.

Type of coffee was either light, medium or strong according to the individual's taste. The highest percentage of the samples preferred light coffee.

Only 16.6 percent of men and 8.6 percent of women had a family history of either Cardiovascular diseases, Diabetes or Hypertension.

With regards to personal history of diseases only 4.7 percent of men and 1.3 percent of women suffered from the above mentioned diseases.

Ninety five percent of men and 92.7 percent of women had a regular meal pattern. The type of oil used or consumed mostly by the samples were gingelly oil and ground nut oil.

Large amount of samples used oil in the 0-30 ml range.

Fried items were taken occasionally by a large number of samples and 2.7 percent took none.

Meal pattern of the sub samples studied revealed that some men had coffee throughout the day and women by contrast did not. Lunch and Dinner was eaten by all. Breakfast was consumed only by 80 percent of men and 73 percent of women.

Food intake calculated for 3 days revealed that men sub samples consumed higher quantities of greens, fruits, milk, meat and fish and sugar than the recommended allowances.

Quantities of food items eaten less than the allowances recommended were cereals, other vegetables, roots and tubers, nuts and oil seeds and egg.

Fats and oils were taken in the right amounts.

In women sub-samples cereals, greens, pulses, other vegetables, roots and tubers, meat and fish were eaten in lesser amounts than amounts recommended.

Fats and oils were eaten in higher amounts with a surplus of 7 g than the recommended allowances.

Food items like fruits, milk, nuts and oil seeds and egg were eaten in higher amounts than the amounts recommended.

Nutrient intake was also calculated for both men and women sub samples. Fats were consumed in high amounts by both men and women when compared to the Recommended Dietary Allowances. Carbohydrates, energy, thiamine, riboflavin, niacin were eaten in amounts lesser than the Recommended Allowances.

The other nutrients such as calcium and iron, protein were eaten in the right amounts.

The cholesterol levels of sub samples were estimated and found that 13.3 percent of men and 66.7 percent of

women had normal serum cholesterol values ie, (140-240) mg%. A slightly higher range upto 250 mg percent was seen in 33.3 percent of men and 13.3 percent in women.

Serum cholesterol values upto 260 mg percent was found in 26.7 percent of men and 6.7 percent of women.

Values from 260 mg percent till 290 mg percent was found among 26.7 percent of men and 13.3 percent in women.

In connection to the effect of coffee consumption on serum cholesterol, it was revealed, that the association is positively significant in both men and women statistically.

Recommendations:

Dietary pattern and coffee drinking pattern and its relation on the effect of serum cholesterol could be studied under controlled conditions.

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APPENDIX

APPENDIX I

QUESTIONAIRE TO ELICIT INFORMATION ON PATTERN OF COFFEE CONSUMPTION AND DIETARY HABITS AMONG ADULTS IN COIMBATORE CITY.

1. Name of the Interviewee :
   Name of the Interviewer :
   Address :

   Age :
   Sex :
   Weight:
   Height:

8. Occupation :

9. Monthly Income :

10. Type of family : Nuclear ☐ Joint ☐

11. Number of family members:

12. Monthly expenditure on food:

13. Monthly expenditure on coffee:

14. How often do your drink coffee in a day?

    1 cup ☐ 2 cups ☐ 3 cups ☐ 4 cups ☐

    5 cups ☐ If more than 5 cups, specify.

15. What is the amount of coffee you take at one time?

16. State the reasons for coffee drinking:

Stress Relieving ☐ Stimulating ☐

Habit ☐ Good in Taste ☐

17. Do you take your meal regularly? Yes ☐ No ☐

18. Indicate your meal pattern:

Breakfast	Mid morning	Lunch	Tea	Dinner

19. Indicate the oil used for cooking.

20. How much oil do you use per month for cooking?

21. Do you take fried items

Daily ☐ Often ☐

Occassionally ☐ Rarely ☐

22. Do you take coffee:

With Meals ☐ With Breakfast ☐

With Lunch ☐ With Tea ☐

With Dinner ☐ Before Meals ☐

After Meals ☐ Between Meals ☐

23. Do you take filtered Coffee, Instant Coffee or any other?

24. Do you prefer your coffee:

Light ☐ Medium ☐ Strong ☐

25. Does your family history indicate the prevalence of any of the following Diseases:

Cardiovascular Diseases ☐ Diabetes Mellitus ☐

Hypertension ☐ Kidney Disease ☐

26. Are you suffering from any of the above mentioned diseases?

Yes ☐ No ☐

27. If, yes, please indicate the Disease:

28. Also give information regarding:

Duration of Illness	Treatment Undertaken

APPENDIX - II

ESTIMATION OF CHOLESTEROL BY ZAK'S METHOD (Varely 1980)

Principle:

Cholesterol reacts with ferric chloride in the presence of concentrated sulphuric acid to give a pink colour. The intensity of the colour developed is directly propotional to the amount of cholesterol present and is read at 540 nm in a spectrocolorimeter.

Reagents:

1. Stock ferric chloride reagent:

   840 mg of pure dry ferric chloride was weighed and dissolved in 100 ml of glacial acetic acid.

2. Ferric chloride precipitating reagent:

   10 ml of stock ferric chloride reagent was taken in 100 ml standard flask and made upto the mark with pure glacial acetic acid.

3. Ferric chloride diluting reagent:

   8.5 ml of stock ferric chloride was diluted to 100 ml with pure glacial acetic acid in a 100 ml standard flask.

4. Standard cholesterol solution:

100 mg pure dry cholesterol was taken in a clean dry 100 ml standard flask and dissolved in a glacial acetic acid. Then made upto the mark with pure glacial acetic acid.

5. Working Standard:

10 ml of the stock was taken up in a 100 ml standard flask containing 0.5 ml of stock ferric chloride reagent and made upto the mark with pure glacial acetic acid. 1.0 ml of this solution contains 100 mg of cholesterol.

Procedure:

0.5 - 2.5 ml of working standard solution were pipetted out into a series of clean dry test tubes. The total volume of each tube was made upto 5.0 ml with ferric chloride diluting reagent.

Diluting Reagent:

To 0.1 ml of serum, added 4.9 ml of ferric chloride precipitating reagent and mixed well. Allowed to stand for a while and centrifuged. Transferred 2.5 ml of the clear supernatant into a dry test tube and added 2.5 ml of ferric chloride diluting reagent. Mixed well. The tubes were kept in cold water and to each tube added 4.0 ml of concentrated Sulphuric acid drop by drop. The solutions

were mixed well. The tubes were allowed to come to room temperature. A blank was also simultaneously prepared by taking 5.0 ml of the diluting reagent and 4.0 ml of concentrated sulphuric acid. After 30 minutes the intensity of the colour developed was read at 540 nm against the reagent blank.

Calculation:

Milligram of Cholesterol per decilitre : $\frac{\text{Test}}{\text{Standard}}$ x 100 mg percent

APPENDIX-III A

FOOD INTAKE OF THE SUB SAMPLES (MEN) - FIRST DAY.

S.No.	Cereals (g)	Pulses (g)	Greens (g)	Other Vegs. (g)	Roots and Tubers (g)	Fruits (g)	Milk (g)	Fats and Oil (g)	Nuts (g)	Meat & Fish (g)	Egg (g)	Sugar (g)
1.	350	40	-	40	60	20	350	55	25	75	50	20
2.	300	35	100	-	-	125	440	50	25	-	50	25
3.	325	60	40	35	-	120	350	45	30	60	-	15
4.	350	35	100	-	100	200	150	45	25	-	50	25
5.	425	-	100	40	-	30	75	35	15	-	35	30
6.	400	20	-	30	-	20	150	35	10	50	-	25
7.	300	60	100	35	-	120	445	45	20	-	-	35
8.	400	65	125	-	-	130	235	45	15	-	-	30
9.	375	50	100	-	60	50	170	35	20	-	-	35
10.	325	50	-	135	-	130	435	40	25	-	-	45
11.	350	40	100	-	50	50	400	40	20	-	50	40
12.	360	35	75	40	75	80	200	45	35	20	50	40
13.	400	30	-	100	100	75	100	25	-	-	20	45
14.	350	30	-	50	75	-	150	25	25	-	20	50
15.	325	30	100	50	100	130	300	35	25	-	-	60

APPENDIX-III B

FOOD INTAKE OF THE SUB SAMPLES (MEN) - SECOND DAY

S.No.	Cereals (g)	Pulses (g)	Greens (g)	Other Vegs. (g)	Roots and Tubers (g)	Fruits (g)	Milk (g)	Fats and Oil (g)	Nuts and oil seed (g)	Meat and Fish (g)	Egg (g)	Sugar (g)
1.	425	25	75	65	-	-	100	35	10	-	-	20
2.	300	55	100	125	100	115	400	35	10	-	-	40
3.	400	25	75	50	100	40	75	30	15	-	50	15
4.	375	45	100	-	60	125	170	40	25	-	-	25
5.	325	50	100	40	80	150	200	40	25	-	-	30
6.	350	35	-	35	-	30	250	30	10	70	50	25
7.	375	40	25	-	100	40	300	35	20	-	50	35
8.	325	-	75	100	-	100	440	45	15	50	-	30
9.	350	50	-	40	100	70	450	50	20	-	50	35
10.	375	45	85	80	90	80	400	50	25	75	-	45
11.	325	60	-	75	-	-	350	55	20	60	-	40
12.	375	65	-	65	75	-	175	40	25	50	50	60
13.	400	40	-	-	100	80	280	50	-	-	-	45
14.	400	65	100	65	40	-	300	55	25	-	-	60
15.	350	40	-	-	50	-	400	50	20	-	50	80

APPENDIX-III C

FOOD INTAKE OF THE SUB SAMPLES (MEN) - THIRD DAY

S.No.	Cereals (g)	Pulses (g)	Greens (g)	Other Vegs. (g)	Roots and Tubers (g)	Fruits (g)	Milk (g)	Fats and Oil (g)	Nuts and Oil seeds (g)	Meat and Fish (g)	Egg (g)	Sugar (g)
1.	375	45	35	85	-	125	400	45	25	-	-	20
2.	375	65	150	35	100	225	385	45	25	-	-	25
3.	400	30	-	35	75	-	375	45	30	75	55	15
4.	350	50	-	40	95	35	350	40	25	75	-	25
5.	400	40	150	45	-	120	325	50	30	100	50	35
6.	375	35	135	-	130	120	325	50	30	80	-	40
7.	400	60	45	100	-	20	375	45	25	-	50	45
8.	300	35	100	-	-	125	440	50	25	-	-	30
9.	350	40	-	40	60	20	350	55	25	75	50	35
10.	400	-	100	-	-	120	150	50	25	70	-	45
11.	325	30	100	50	100	130	450	35	25	-	-	40
12.	375	45	35	85	-	125	400	45	25	-	-	60
13.	400	40	150	45	-	120	325	50	30	100	-	50
14.	400	65	150	35	100	100	440	55	30	120	-	55
15.	375	40	100	40	75	-	375	40	25	135	-	60

APPENDIX-III D

FOOD INTAKE OF THE SUB SAMPLES (WOMEN) - FIRST DAY

S.No.	Cereals (g)	Pulses (g)	Greens (g)	Other Vegs. (g)	Roots and Tubers (g)	Fruits (g)	Milk (g)	Fats and Oil (g)	Nuts and Oil Seed (g)	Meat and Fish (g)	Egg (g)	Sugar (g)
1.	300	-	100	-	85	50	200	40	25	60	-	20
2.	300	50	-	40	65	30	250	50	25	75	50	40
3.	350	35	-	45	25	30	200	40	30	50	50	40
4.	375	40	-	-	-	25	300	40	25	60	50	25
5.	275	50	100	50	95	100	75	35	25	40	-	25
6.	325	40	-	50	100	25	75	40	25	70	-	20
7.	325	-	-	20	85	100	75	25	10	35	-	25
8.	335	20	100	-	-	35	75	25	20	50	50	20
9.	300	15	-	-	60	10	75	25	15	35	-	20
10.	300	50	100	-	-	30	175	40	25	50	55	20
11.	300	15	75	35	-	20	225	25	20	25	-	20
12.	325	-	-	30	-	35	150	35	20	75	50	20
13.	325	40	-	75	-	30	225	45	25	60	50	30
14.	375	50	100	-	65	50	200	25	20	-	50	20
15.	350	40	100	25	100	100	200	35	20	50	-	20

APPENDIX-III E

FOOD INTAKE OF THE SUB SAMPLES (WOMEN) - SECOND DAY

S.No.	Cereals (g)	Pulses (g)	Greens (g)	Other Vegs. (g)	Roots and Tubers (g)	Fruits (g)	Milk (g)	Fats and Oil (g)	Nuts and Oil Seed (g)	Meat and Fish (g)	Egg (g)	Sugar (g)
1.	300	60	75	75	85	100	350	35	25	-	-	20
2.	300	25	100	-	-	25	75	20	35	50	-	25
3.	350	60	100	50	60	50	300	35	25	-	-	40
4.	250	40	100	100	35	45	200	35	25	-	-	20
5.	250	55	140	-	100	30	200	35	20	-	-	25
6.	300	55	100	75	-	20	150	35	-	-	-	20
7.	350	55	150	100	-	25	245	60	40	20	-	20
8.	325	-	75	-	50	-	100	30	10	-	-	20
9.	350	40	-	-	-	50	125	25	15	-	-	20
10.	275	50	150	50	75	75	125	40	20	-	-	25
11.	325	-	100	-	40	-	100	25	15	25	-	30
12.	250	60	-	50	-	-	200	35	20	-	50	20
13.	250	55	-	60	-	100	350	40	15	-	-	20
14.	275	50	150	50	-	75	375	40	15	-	-	20
15.	275	50	100	-	70	30	250	45	25	75	-	20

APPENDIX-III F

FOOD INTAKE OF THE SUB SAMPLES (WOMEN) - THIRD DAY

S.No.	Cereals (g)	Pulses (g)	Greens (g)	Other Vegs. (g)	Roots and Tubers (g)	Fruits (g)	Milk (g)	Fats and Oil (g)	Nuts and Oil Seed (g)	Meat and Fish (g)	Egg (g)	Sugar (g)
1.	200	75	-	100	100	50	250	40	30	-	-	20
2.	250	75	-	-	100	100	200	30	-	-	-	40
3.	300	75	-	50	100	-	200	30	30	-	-	40
4.	275	25	150	35	80	20	75	25	10	-	-	20
5.	300	20	35	30	-	70	160	20	15	-	-	25
6.	275	15	115	35	75	20	150	15	10	-	-	20
7.	300	25	-	30	100	20	175	25	15	-	-	20
8.	325	30	100	300	75	-	100	20	-	-	-	20
9.	300	55	150	750	-	100	280	40	20	-	-	20
0.	350	60	100	50	60	100	300	35	20	-	-	30
1.	300	15	-	-	60	20	75	25	15	35	-	20
2.	300	55	-	70	60	100	300	40	25	40	50	20
3.	300	-	25	35	35	30	325	45	30	50	-	20
4.	250	40	100	100	35	-	200	35	25	30	-	20
5.	325	55	100	75	-	-	150	35	20	-	-	20

APPENDIX-IV A

NUTRIENT INTAKE OF THE SUB SAMPLES (MEN) - FIRST DAY.

S.No.	Protein (g)	Fats (g)	CHO (g)	Energy (K.cal)	Calcium (mg)	Iron (mg)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin C (mg)	Fibre (g)
1.	67.4	74	328	2261	0.6	55.5	0.59	0.69	8.1	17	2.6
2.	68.7	73	397	2593	0.6	32.7	1.38	1.39	14.5	80	6.3
3.	60	61	351	2142	0.2	18.87	1.17	0.87	15.3	25	2.7
4.	67.5	55	363	2168	0.5	18.4	0.73	1.61	9.9	51	3.6
5.	48.5	58	373	2248	1.0	25.3	1.62	0.9	8.7	239	4.6
6.	50.1	46	354	2016	0.2	15.9	0.49	0.51	8.4	44	1.9
7.	53.8	67	439	2773	1.0	39.1	0.96	1.4	13.1	254	8.0
8.	60.5	64	394	2427	0.5	25.8	0.81	0.5	11.7	55	2.2
9.	46.2	54	334	2118	0.8	22.4	0.65	0.4	9.9	152	3.2
10.	52.7	59	256	2237	1.1	36.6	0.94	1.59	10	240	8.1
11.	75.9	31.7	450	2553	1.4	59.4	2.1	2.07	5.8	110	3.5
12.	62.6	75	262	2082	1.2	32.5	1.17	0.94	9.7	176	4.5
13.	58.4	57	339	2225	0.6	19.8	1.29	0.75	10.3	129	2.3
14.	66.1	32	365	2017	0.4	22.6	0.63	0.4	10	21	3.1
15.	44.5	65	310	1996	0.3	15.2	0.6	1.14	8.2	117	4.7

APPENDIX-IV B

NUTRIENT INTAKE OF THE SUB SAMPLES (MEN) - SECOND DAY.

S.No.	Protein (g)	Fats (g)	CHO (g)	Energy (K.cal)	Calcium (g)	Iron (mg)	Thia-mine (mg)	Ribo flavin (mg)	Niacin (mg)	Viata-min C (mg)	Fibre (g)
1.	42.2	38	372	2005	0.3	17.5	0.72	0.45	9.4	45	3.1
2.	69.8	66	324	2161	1.2	34.5	0.83	0.95	8.6	111	7.8
3.	47.4	34	362	1944	8.5	20.9	0.46	0.46	14.3	171	2.5
4.	79.8	60	270	2025	0.87	36.4	0.59	0.61	6.9	50	2.9
5.	61.25	63.0	325	2218	0.5	13.11	7.8	1.86	13.6	89	4.3
6.	70.9	61.9	282.8	2048	0.9	27.5	1.2	1.6	15.2	19	5.9
7.	61.6	60.3	339	2315	0.6	17.19	0.7	1.5	9.2	59	6.3
8.	68.2	46.0	390.4	2264	0.9	31.1	3.3	4.5	4.4	78.2	9.2
9.	63.19	38.9	287.8	2221	0.7	27.6	1.24	1.26	8.2	60.7	8.2
10.	55.5	52	357	2095	1.2	25.2	0.62	0.71	11.2	42	4.2
11.	58.6	50	344	2052	0.4	18.4	0.87	2.1	15.4	59	6.4
12.	70.3	61.2	297	2121.5	0.8	32.0	0.52	1.23	18.6	35	2.9
13.	64.9	52.1	364.5	2289	0.2	18.2	0.61	0.87	10.2	47	3.1
14.	70	38	297	2022	1.2	25.9	0.9	0.92	9.87	89	9.2
15.	72.2	64.2	283	2148	0.5	31.4	0.63	0.54	7.9	77	10.2

APPENDIX-III C

FOOD INTAKE OF THE SUB SAMPLES (MEN) - THIRD DAY

S.No.	Cereals (g)	Pulses (g)	Greens (g)	Other Vegs. (g)	Roots and Tubers (g)	Fruits (g)	Milk (g)	Fats and Oil (g)	Nuts and Oil seeds (g)	Meat and Fish (g)	Egg (g)	Sugar (g)
1.	375	45	35	85	-	125	400	45	25	-	-	20
2.	375	65	150	35	100	225	385	45	25	-	-	25
3.	400	30	-	35	75	-	375	45	30	75	55	15
4.	350	50	-	40	95	35	350	40	25	75	-	25
5.	400	40	150	45	-	120	325	50	30	100	50	35
6.	375	35	135	-	130	120	325	50	30	80	-	40
7.	400	60	45	100	-	20	375	45	25	-	50	45
8.	300	35	100	-	-	125	440	50	25	-	-	30
9.	350	40	-	40	60	20	350	55	25	75	50	35
10.	400	-	100	-	-	120	150	50	25	70	-	45
11.	325	30	100	50	100	130	450	35	25	-	-	40
12.	375	45	35	85	-	125	400	45	25	-	-	60
13.	400	40	150	45	-	120	325	50	30	100	-	50
14.	400	65	150	35	100	100	440	55	30	120	-	55
15.	375	40	100	40	75	-	375	40	25	135	-	60

APPENDIX-III D

FOOD INTAKE OF THE SUB SAMPLES (WOMEN) - FIRST DAY

S.No.	Cereals (g)	Pulses (g)	Greens (g)	Other Vegs. (g)	Roots and Tubers (g)	Fruits (g)	Milk (g)	Fats and Oil (g)	Nuts and Oil Seed (g)	Meat and Fish (g)	Egg (g)	Sugar (g)
1.	300	-	100	-	85	50	200	40	25	60	-	20
2.	300	50	-	40	65	30	250	50	25	75	50	40
3.	350	35	-	45	25	30	200	40	30	50	50	40
4.	375	40	-	-	-	25	300	40	25	60	50	25
5.	275	50	100	50	95	100	75	35	25	40	-	25
6.	325	40	-	50	100	25	75	40	25	70	-	20
7.	325	-	-	20	85	100	75	25	10	35	-	25
8.	335	20	100	-	-	35	75	25	20	50	50	20
9.	300	15	-	-	60	10	75	25	15	35	-	20
10.	300	50	100	-	-	30	175	40	25	50	55	20
11.	300	15	75	35	-	20	225	25	20	25	-	20
12.	325	-	-	30	-	35	150	35	20	75	50	20
13.	325	40	-	75	-	30	225	45	25	60	50	30
14.	375	50	100	-	65	50	200	25	20	-	50	20
15.	350	40	100	25	100	100	200	35	20	50	-	20

APPENDIX-IV E

NUTRIENT INTAKE OF THE SUB SAMPLES (WOMEN) - SECOND DAY

S.No.	Protein (g)	Fats (g)	CHO (g)	Energy (K.cal)	Calcium (g)	Iron (mg)	Thia-mine (mg)	Ribo flavin (mg)	Niacin (mg)	Viata-min C (mg)	Fibre (g)
1.	44.5	61	328	1783	0.6	37	1.4	0.9	11	120	4
2.	40.3	39	327	1841	0.3	15.1	1.27	0.57	15.9	17	2.1
3.	52	56	358	1900	0.4	15.2	1.1	1.4	9.8	85	3.2
4.	38.2	48	249	1678	0.6	49.8	1.29	0.49	6.8	41	7.9
5.	45.7	42	299	1769	0.4	17.2	1.28	1.38	11.1	68	6.2
6.	41.7	54	283	1790	0.8	37.2	0.49	1.72	7.7	97	6
7.	39.2	57	265	1736	0.7	37.9	0.96	0.76	7.9	123	4.2
8.	43.6	54.2	210.4	1625	0.8	8.2	0.9	1.58	9.3	49	5.1
9.	54.8	27.4	270.3	1545	0.9	14.4	1.1	1.44	9.2	39	3.8
10.	60	69	278	2112	0.3	25	0.93	1.3	12.1	60	5.4
11.	80.2	25.7	219	1530	0.2	36.1	2.1	2.3	11.1	58.2	4.8
12.	48.5	41.9	298	2058	0.65	38.6	1.07	3.1	10.25	34.0	4.1
13.	57.3	60	359	2547	0.5	39.1	1.3	0.97	12.1	120	6.9
14.	48.9	65	250	2002	0.8	19.0	0.9	1.12	14	71	6.2
15.	63.9	70	349	2488	0.6	32.1	1.27	1.4	17.4	54	4.9

APPENDIX-IV F

NUTRIENT INTAKE OF THE SUB SAMPLES (WOMEN) - THIRD DAY

S.No.	Protein (g)	Fats (g)	CHO (g)	Energy (K.cal)	Calcium (g)	Iron (mg)	Thia-mine (mg)	Ribo flavin (mg)	Niacin (mg)	Viata-min C (mg)	Fibre (g)
1.	43.6	69.0	145.4	1655	1.007	16.14	1.44	1.28	7.39	42.5	4.5
2.	40	40.53	261.8	1746	.4	5.9	0.89	0.76	8.2	41	2.7
3.	61.6	60.32	339.2	2315	0.6	7.19	0.78	1.18	8.84	76	6.2
4.	32.2	30	273	1496	0.6	33.3	0.5	0.32	7.7	86	3.2
5.	31.9	28	284	1505	0.3	12.2	0.6	0.3	6.6	50	1.4
6.	33.1	21	319	1634	0.2	13.7	0.61	0.33	7.8	24	2.9
7.	27.1	26	201	1711	0.1	14.5	0.76	0.42	7.1	24	2.9
8.	32.0	29	336	1765	0.2	13.4	0.6	0.51	17.4	81	2.6
9.	51.2	73	273	1651	0.5	16	0.99	0.96	12	33	5.6
10.	52	56	358	1900	0.4	15.2	1.1	1.4	9.8	85	3.2
11.	41.8	33	283	1605	0.2	20.5	0.93	0.48	15.1	23	2.5
12.	71.7	81	278	2127	0.7	24.8	0.9	1.37	11.6	50	4.5
13.	68	78	296	2061	0.9	39.5	0.77	1.2	8.6	118	4.4
14.	53.2	44	363	2113	0.8	25.4	0.85	0.84	10.9	268	4.9
15.	43.8	50	333	2007	0.8	53.7	1.3	1.04	17.1	228	6.3

APPENDIX V

COMPUTATION OF CORELATION COEFFICIENT OF THE EFFECT OF COFFEE CONSUMPTION ON SERUM CHOLESTEROL LEVELS IN MEN AND WOMEN

The effect of coffee consumption on serum cholesterol was computed statistically. Co-relation coefficient was made use of to know if coffee consumption had a definite effect on serum cholesterol or not.

Men

$$r = \frac{N \Sigma dx\, dy - \Sigma dx\, \Sigma dy}{\sqrt{N \Sigma dx^2 - (\Sigma dx)^2}\ \sqrt{N \Sigma dy^2 - (\Sigma dy)^2}}$$

where, $\Sigma dxdy = 7800$

$N = 15$

$\Sigma dx = -1700$

$\Sigma dy = 214$

$\Sigma dx^2 = 500000$

$\Sigma dy^2 = 18,720$

$$= \frac{15 \times 7800 - (-1700)(214)}{15 \times 500000 - (-1700)^2\ \ 15 \times 18,720 - (214)^2}$$

$r = 0.34$

Women

$$r = \frac{N \Sigma dx\, dy - \Sigma dx\, \Sigma dy}{\sqrt{N \Sigma dx^2 - (\Sigma dx)^2}\sqrt{N \Sigma dy^2 - (\Sigma dy)^2}}$$

where, $N = 15$;

$\Sigma dxdy = 15100$

$\Sigma dx = 1950$

$\Sigma dy = -78$

$\Sigma dx^2 = 107,75,00$

$\Sigma dy^2 = 4116$

$$r = \frac{15 \times 15100 - (1950)\,(-78)}{15 \times 107,75,00 - (1950)^2\ 15 \times 4116 - (-78)^2}$$

$r = 0.09$